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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/040,104	10/19/2001	Chun-Keng Hsu	67,200-531	8828

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EXAMINER	
CHIN, PAUL T	
ART UNIT	**PAPER NUMBER**
3652	

DATE MAILED: 10/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/040,104	HSU ET AL.
	Examiner	Art Unit
	PAUL T. CHIN	3652

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-- The MAILING DATE of this communication appears on the cover sheet with th correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 March 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 4-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2 and 4-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *11 March 2003* is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

1. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on March 11, 2003, has been approved. A proper drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The correction to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1,2,4-7, and 14-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claimed language of "*said strain sensor is sensitive to at least 1 micrometer strain*" (claims 1 and 14) is not clearly understood. The engineering "strain" is obtained by dividing a changed in length and the original length (see Appendix A, a copy of defined by "Engineering Materials and Their Applications" by Flinn/Trojan, third addition), meaning the "strain" has no unit (dimensionless). Therefore, the phrase "*strain sensor is sensitive to at least 1 micrometer strain*" is confusing. The examiner assumes that the piezoelectric sensor has 1 micrometer thickness.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1,2, and 4-20, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over **Park et al. (U.S. Patent Application Publication 2001/0051088) in view of Wakabayashi et al. (6,469,421) or Akiyama et al. (US 2002/0017835).**

Park et al. ['088] discloses a wafer pickup system comprising a wafer blade (32) (see Figs. 5,6, and 8) having a blade body with an elongated shape which has a top surface, and a bottom surface (34); the wafer blade having a fork shape in the distal end (see Fig. 4) and also having a substantially rectangular shape in the base area (see Fig. 4); and a tactile sensor or a strain sensor (43,63), which is a thin film (Re claim 7), mounted on the bottom surface (34) of the blade body. Park et al.' wafer pickup system ['088] does not show *the thickness of the strain sensor is 1 micrometer*.

However, **Wakabayashi et al. (6,469,421)** shows *a thin film, a piezoelectric layer* (1,2) (see Figs. 1 and 2) having not greater than 1 micrometer (Col 2, lines 59-64). **Akiyama et al. (US 2002/0017835)** shows *a piezoelectric layer* (2) (see Fig. 1) having a range of 1 to 5 micrometer (see paragraph 20). Accordingly, it would have been an obvious to one of the ordinary skill in the art at the time the invention was made to provide *the thickness of the strain sensor is 1 micrometer* on the bottom surface of the blade of Park et al.' wafer pickup system ['088] as taught by Wakabayashi et al. (6,469,421) or Akiyama et al. (US 2002/0017835) in order to provide thin layer, but good sensitivity.

Re claims 6 and 11, the modified Park et al.'s wafer pickup system ['088] discloses that the blade body is being made of metal (page 1, second column, the third paragraph) or a ceramic (page 1, second column, the fourth paragraph).

Re claims 14 and 18, the modified Park et al.'s wafer pickup system ['088] further shows an alarm system or device (page 2, the second column, lines 1-6) receiving signals from the sensors to a controller (46).

Re claims 15 and 16, the modified Park et al.'s wafer pickup system ['088] shows the wafer blade having a fork shape in the distal end (see Fig. 4) and also having a substantially rectangular shape in the base area (see Fig. 4).

Re claim 17, the modified Park et al.'s wafer pickup system ['088] shows the alarm system receiving an electric current or signals produced by the sensors (page 2, the first column, the last paragraph) when a strain is detected.

Re claim 19, Park et al.'s wafer pickup system ['088] shows that the alarm system could be a visual system such as a warning light (page 2, the second column, lines 1-6).

Response to Arguments

5. Applicant's arguments with respect to claims 1,2 and 4-20 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Woodmansee et al. (6,478,565) shows piezoelectric sensor (Fig. 8).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PAUL T. CHIN whose telephone number is (703) 305-1524. The examiner can normally be reached on MON-THURS (7:30 -6:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, EILEEN LILLIS can be reached on (703) 308-3248. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9326 for regular communications and (703) 872-9327 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-1113.

Paul Chin

PAUL T. CHIN
Examiner
Art Unit 3652

PTC
October 20, 2003

Appendix A

Engineering stress $= \frac{P}{A_0}$ units: pounds per square inch (psi) or newtons per square meter (N/m^2) or pascals (Pa; $1\ N/m^2 = 1$ Pa)

Engineering strain $= \epsilon = \frac{\text{change in length}}{\text{original length}}$ units dimensionless: in./in. or m/m

We use the terms *engineering* stress and *engineering* strain because later we shall define *true* stress and strain. In this example of elastic deformation, the difference between the true and the engineering values is very small. If we calculate the stress in the wire and the strain produced, we find the relation

$$E = \frac{\sigma}{\epsilon} \qquad \text{units: psi or } N/m^2 \text{ or Pa}$$

where E is called the *modulus of elasticity*. As long as we are careful not to reach too high a stress, the deformation is principally elastic and E is a constant. For each group of materials E has a characteristic value. For example, $E = 30 \times 10^6$ psi (2.07×10^5 MPa)† for all steels and 10×10^6 psi (0.69×10^5 MPa) for aluminum alloys. The modulus is basically related to the bonding between atoms.

This is the macroscopic picture of elastic strain, and it can be deceivingly simple. Let us go to the other extreme and test a single crystal of iron rather than a wire, which contains thousands of grains or crystals.

If we stress the single crystal along different crystal directions, we get values quite different from 30 million psi (2.07×10^5 MPa).

Crystal direction:	[111]	[100]
E (10^6 psi):	41	18
E (10^5 MPa)	2.83	1.24

Although this seems astonishing at first, recall that in BCC structures (iron at room temperature) the atomic packing is densest in [111], the direction of highest E. We would expect that the interatomic forces would be greatest along this direction and therefore that the stress required to produce a given strain would be highest.

How do we explain the practically constant value of 30×10^6 psi (2.07×10^5 MPa) for steel? We get this value when there are many crystals of different orientations, because our measurement gives the average value. There are occasional important exceptions for which we must remember the properties of the single crystal. Let us consider some examples.

† 1 psi $= 6.9 \times 10^3\ N/m^2 = 6.9 \times 10^{-3}\ MN/m^2 = 7.03 \times 10^{-4}\ kg/mm^2$ (MN = meganewton). 1 MPa $= 1\ MN/m^2$ (MPa = megapascal).